



S/N 09/259,849

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Paul A. Farrar

Examiner: Ginette Peralta

Serial No.: 09/259,849

Group Art Unit: 2814

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Docket: 303.557US1

Title: CONDUCTIVE STRUCTURES IN INTEGRATED CIRCUITS

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request. This request is being filed with a Notice of Appeal. The review is requested for the reason(s) stated below:

Regarding the § 103(a) rejection of claims 1-7, 12-17, 19-21, 23-25, 27-32, 34-36, 38-41, 56-77, and 186-189 (Havemann et al./Brown et al.).

Applicant maintains all of the arguments presented on pages 19-26 of Applicant's previous response,¹ regarding the rejection of claims 1-7, 12-17, 19-21, 23-25, 27-32, 34-36, 38-41, 56-77, and 186-189 under 35 U.S.C. § 103(a) as being unpatentable over Havemann *et al.* (U.S. 6,358,849) in view of Brown *et al.* (U.S. 6,168,704).

Applicant believes they have shown that the proposed combination of references fails to disclose each of the elements included in the rejected claims. For example, in Applicant's previous response on page 19, Applicant lists elements recited in independent claims 1, 4, 12, 15, 19, 23, 27, 30, 34, 38, 56, 67, and 186 and not taught or suggested by the proposed combination of Havemann *et al.* and Brown *et al.* As also noted on page 19 of Applicant's previous response, the Office Action² admits that Havemann *et al.* does not disclose these elements. Further, Applicant believes that, based at least on the arguments presented in Applicant's previous response on page 19, Brown *et al.* also fails to teach or suggest these elements recited in claims 1, 4, 12, 15, 19, 23, 27, 30, 34, 38, 56, 67, and 186 and admittedly missing from Havemann *et al.* For example, claim 1 recites, "wherein the selected areas are directly on a top surface of the

¹ Applicant's previous response was mailed by Applicant's representatives on November 8, 2005 in response to an Office Action, the Office Action having been mailed on September 8, 2005 in the 09/259,849 application.

insulator," (Emphasis added). Applicant's previous response on page 19 states,

In Brown *et al.*, even after removal of the photomask, the dielectric material 410 is still covered by conductive layer 415, and therefore any areas where the barrier metal layer 400A and the copper seed layer 400B are removed could not be directly on a top surface of the dielectric material 410.

In the response to that argument, the Advisory Action³ on page 2 states,

Applicant's argument that Brown et al. disclose that the selected areas that are removed could not be directly on a top surface of the dielectric material 410, it is noted that the examiner did not identify 410 as the dielectric material, but rather the claims language requires "an insulator over a planarized surface" and with regards to the series of figures 4, the insulator is dielectric mater 420, and the selected areas that are removed are directly on a top surface of the dielectric mater, hence the limitation is taught and suggested by Brown et al.

Applicant disagrees. The Office Action on page 3 states, "Brown et al. discloses a method of forming a conductor that comprises etching a trench 405 having a depth on an insulator (col. 6, lines 3-6)." (Emphasis added). Brown et al. at column 6, lines 3-6 states,

As shown in FIG. 4A, a barrier metal layer 400A and a copper seed layer 400B may be selectively formed only in an opening (such as a trench) 405 that is formed in a layer of dielectric material 410 disposed on a structure layer 412. (Emphasis added).

Thus, the Office Action clearly refers to layer 410 of Brown et al. in an attempt to supply an insulator as recited in the claims. Further, with respect to layer 420, Brown et al. at column 6, lines 34-41 states,

Again, the portions of the barrier metal and copper seed layers 400A and 400B overlying the conductive layer 415 would effectively be removed, by being converted into a silicide that is later selectively covered by an insulating layer 420 (shown in phantom in FIG. 4A), leaving the unconverted and uncovered barrier metal and copper seed layers 400A and 400B selectively formed only in the opening 405. (underlining added)

Thus, layer 420 in Brown et al. covers the silicide. This clearly fails to teach the elements included in, for example, claim 1 of:

2 See the Office Action mailed September 8, 2006 in the 09/259,849 application.

3 See the "Advisory Action Before the Filing of an Appeal Brief" mailed December 27, 2005 in the 09/259,849 application.

depositing a barrier layer on the insulator;
depositing a seed layer directly on the barrier layer;
removing the barrier layer and seed layer from selected areas of the insulator,
leaving a seed area; and
depositing a conductor on the seed area by a selective deposition process after
removing the barrier layer and seed layer from selected areas of the insulator;
wherein the selected areas are directly on a top surface of the insulator.

Because the statements in the Advisory Action fail to remedy the deficiencies of Havemann et al. and Brown et al. in disclosing each of the elements included in independent claims 1, 4, 12, 15, 19, 23, 27, 30, 34, 38, 56, 67, and 186, Applicant maintains that, for at least the reasons stated in Applicant's previous response, and the additional arguments presented in this paper, the proposed combination of Havemann et al. and Brown et al. used as the basis for forming the rejection of claims 1-7, 12-17, 19-21, 23-25, 27-32, 34-36, 38-41, 56-77, and 186-189 fails to render these claims obvious.

In addition, Applicant maintains each of the arguments presented in Applicant's previous response related to the Office Action's failure to state a proper basis for forming the proposed combination of Havemann et al. and Brown et al. The Office Action bases the motivation to combine Havemann et al. and Brown et al. on the alleged "reducing the manufacturing cost, reducing consumption of electroplating solution and CMP consumables, reducing the amount of post-metallization deposition CMP needed and reducing the about of hazardous effluents as disclosed in Brown et al. in col. 16, lines 42-67 and col. 17, lines 1-24."⁴

As noted in Applicant's previous response, for example on pages 20-21, these proposed savings (while Applicant does not admit that there are any savings) relate to the selective deposition of the copper layer (and not to removal of the barrier layer and the seed layer as suggested in the Office Action) as the basis for the reduced manufacturing costs. Thus, the statements made in the Office Action in support to the combination of the references are not supported by the disclosure in the references themselves.

Another argument made in Office Action and again in the Advisory Action, in an attempt to justify the proposed combination of Havemann et al. and Brown et al., states that Brown et al. in column 1, lines 20-46 discussed the use of different materials such as gold and silver as

⁴ See for example the Office Action mailed September 8, 2006 in the 09/259,849 application at pages 3-4.

"alternatives" to copper. As noted on page 26 of Applicant's previous response, the cited portion of Brown et al. discuss various problems and constraints when using alternative material in the formation of semiconductor devices, and so Brown et al. teaches away from the use of one or more of these materials as alternatives in particular applications based on these characteristics. The proposition that these material are "alternatives" is not supported by, and is contrary to, the disclosure of the cited references. Brown et al. actually discourages certain applications of these materials based on the particular application, and therefore the disclosure in Brown et al. does not support forming the proposed combination of Havemann et al. with Brown et al. as suggested by the Office Action.

Because the basis for forming the proposed combination of Havemann et al. and Brown et al. as stated in the Office Action is not supported by the disclosure in the references themselves, the Office Action fails to state a *prima facie* case of obviousness in rejecting claims 1-7, 12-17, 19-21, 23-25, 27-32, 34-36, 38-41, 56-77, and 186-189, because the Office Action fails to show the desirability⁵ of forming the combination of Havemann et al. and Brown et al.

For at least the reasons stated in Applicant's previous response and the additional arguments presented in this paper, Applicant requests withdrawal of the rejection and reconsideration and allowance of claims 1-7, 12-17, 19-21, 23-25, 27-32, 34-36, 38-41, 56-77, and 186-189.

Regarding the § 103(a) rejection of claims 42-44 and 50-55 and claims 18, 22, 26, 33, and 37 (Havemann et al./Brown et al./Ting et al.).

Applicant maintains all of the arguments presented on pages 22-26 of Applicant's previous response regarding the rejection of claims 42-44 and 50-55 and claims 18, 22, 26, 33, and 37 under 35 U.S.C. § 103(a) as being unpatentable over Havemann et al. in view of Brown et al. and Ting et al. (U.S. 5,969,422). Applicant believes that the arguments presented on pages 22-26 of Applicant's previous response demonstrate the proposed combination of Havemann et al., Brown et al., and Ting et al. fails to teach or suggest each of the elements recited in these claims, and further, that the Office Action fails to states a *prima facie* case of obviousness with

⁵ The fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990); MPEP § 2143.01. (emphasis added).

respect to these claims by failing to provide a proper basis for forming the proposed combination of these references.

For at least the reasons stated in Applicant's previous response and the additional arguments presented in this paper, Applicant requests withdrawal of the rejections, and reconsideration and allowance of claims 42-44 and 50-55 and claims 18, 22, 26, 33, and 37.

CONCLUSION

The applicant respectfully submits that all of the pending claims are in condition for allowance, and such action is earnestly solicited. The Examiner is invited to telephone the below-signed attorney at (612) 349-9587 to discuss any questions which may remain with respect to the present application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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8 Feb '06

By


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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 8 day of February, 2006.

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